

MAX-Mex Overview

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University of Arkansas at Little Rock – Argonne National Laboratory

DOE Atmospheric Science Program Annual Review Meeting

MAX-Mex Nuggets Session

October 26, 2006



MAX-Mex

Megacity Aerosol Experiment - Mexico City (MAX-Mex)

Planning Began January 2005

- Jeff Gaffney (ANL) –
Lead Scientist
- Larry Kleinman (BNL), John Hubbe (PNNL) –
Research Aircraft Operations and Flight Plans
- Jerome Fast (PNNL) –
Modeling, Forecasts, Planning for Ground and G-1
- Christopher Doran (PNNL), Will Shaw (PNNL), Rich Coulter (ANL) –
Ground Site Identification, Meteorological Infrastructure Deployment

MILAGRO - March 2006

Megacity Initiative - Local and Global Research Observations

MCMA-2006 – *Mexico City Metropolitan Area – 2006*

Lead Scientist – Luisa Molina (Molina Center for Energy and Environment, MIT)

Adrian Fernandez – Instituto Nacional de Ecologia

MAX-Mex – *Megacity Aerosol Experiment – Mexico City*

DOE: Lead Scientist, Jeff Gaffney (ANL, UALR)

Program Manager, Rickey Petty

MIRAGE-Mex – *Megacity Impacts on Regional and Global Environments – Mexico City*

NSF: Lead Scientist, Sasha Madronich (NCAR)

Program Manager, Anne-Marie Schmoltnner

INTEX-B – *Intercontinental Chemical Transport Experiment (NASA, NSF)*

NASA: Lead Scientist, Hanwant Singh

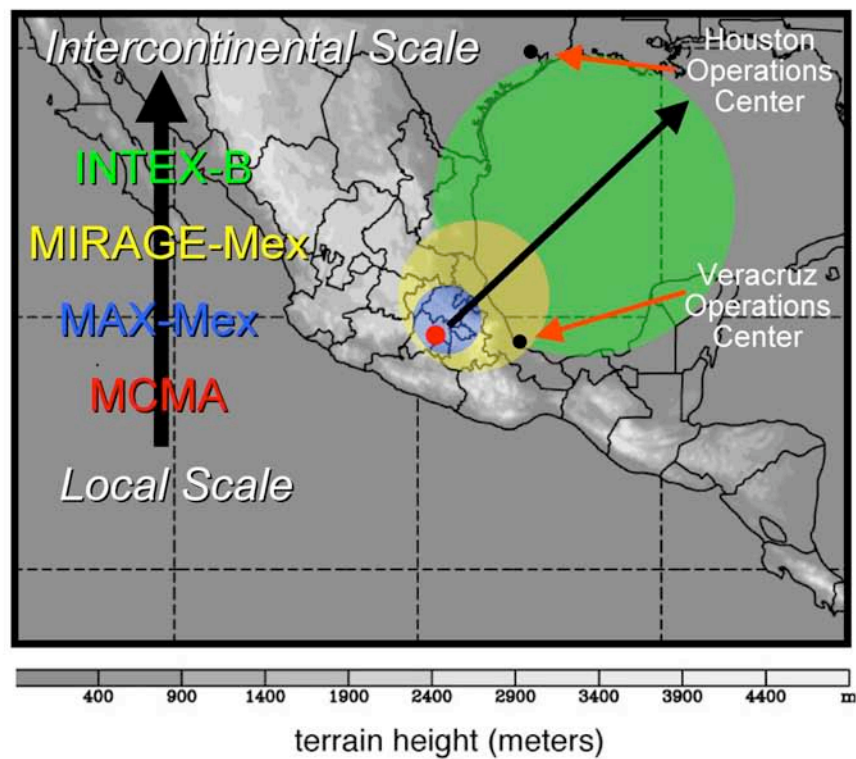
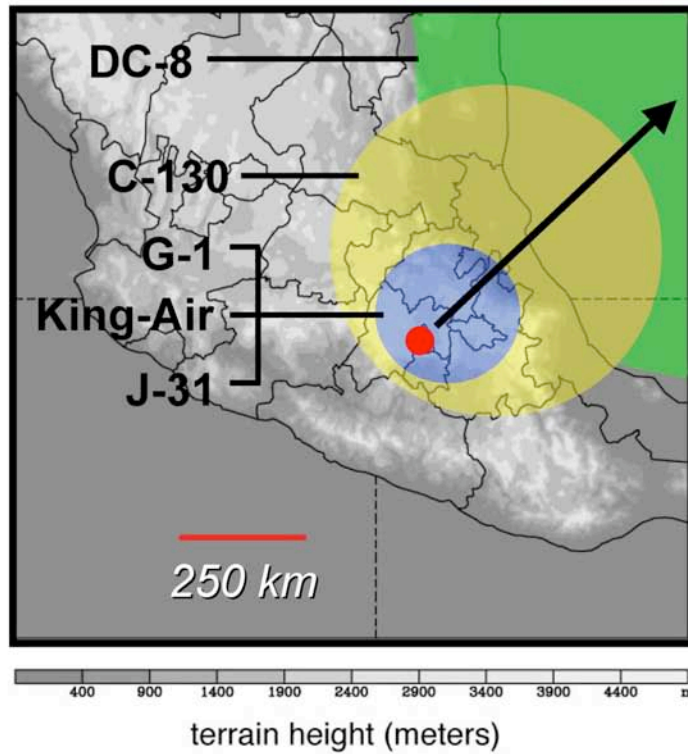
Program Manager, Bruce Doddridge



MCE²



Geographic Relation of Projects



G-1 (DOE)



C-130 (NCAR)



King-Air (NASA)



Twin Otter (U Montana)

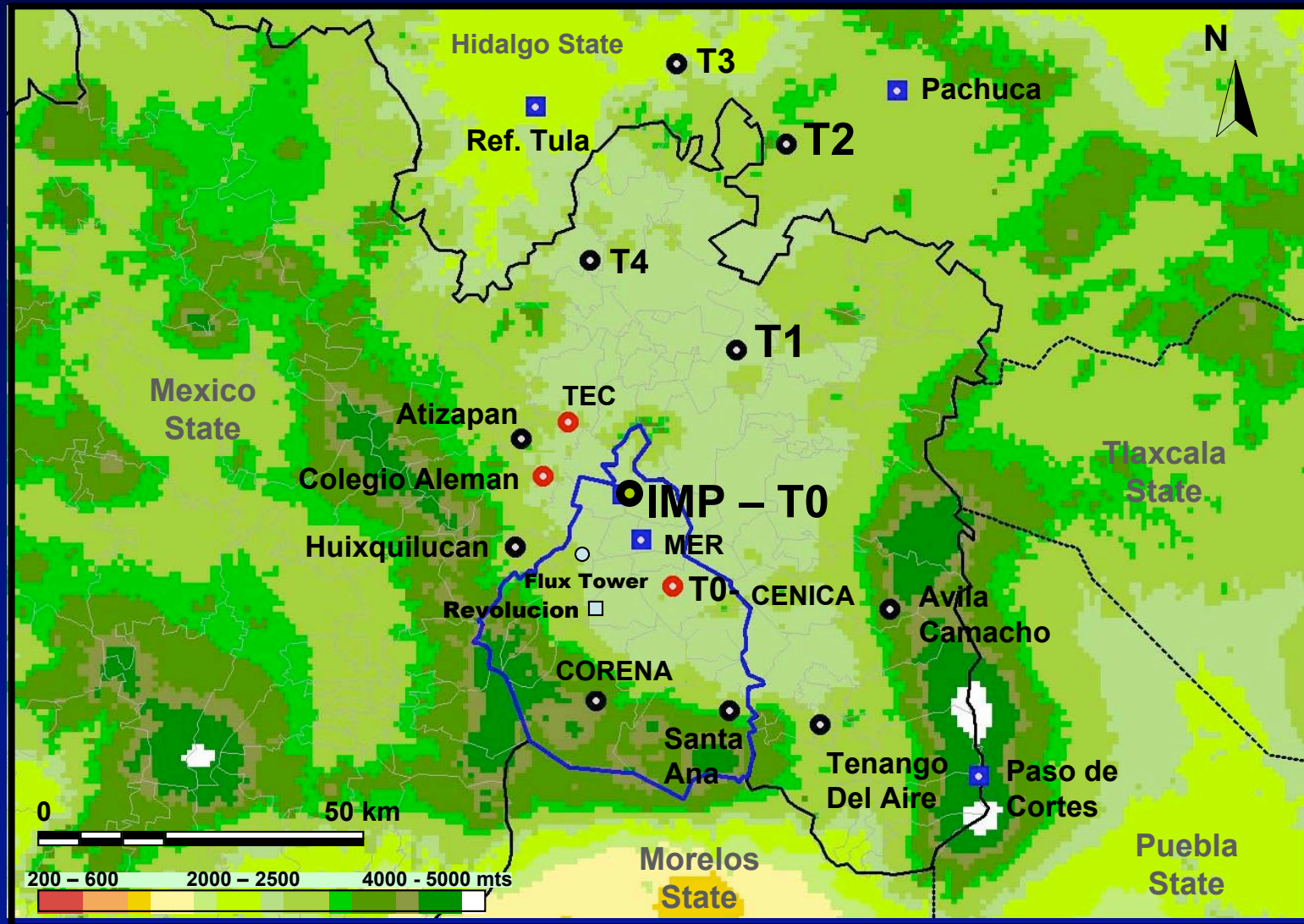


J-31 (NASA)



DC-8 (NASA)

MILAGRO Measurement Sites



● Mobile site ● Fixed site ■ Other measurements

MAX-Mex Science Tasks, Issues, Questions

Characterize aerosol size-dependent composition

Internal mixture vs external mixture

Water uptake dependence on relative humidity

Characterize aerosol optical properties and dependence on controlling variables

Composition, size dependence, size-dependent composition, humidity

Effects of chemical processing/aging

Contribution of BC and species other than BC to absorption

Characterize aerosol cloud nucleating properties and dependence on controlling variables

Composition, size dependence, size-dependent composition, humidity

Effects of chemical processing/aging

MAX-Mex Science Tasks, Issues, Questions, Cont.

Characterize and quantify secondary aerosol formation and aerosol evolution

New particle formation vs condensational growth

Role of coagulation in modifying size and composition distribution

Mechanism(s) of new particle formation and responsible species

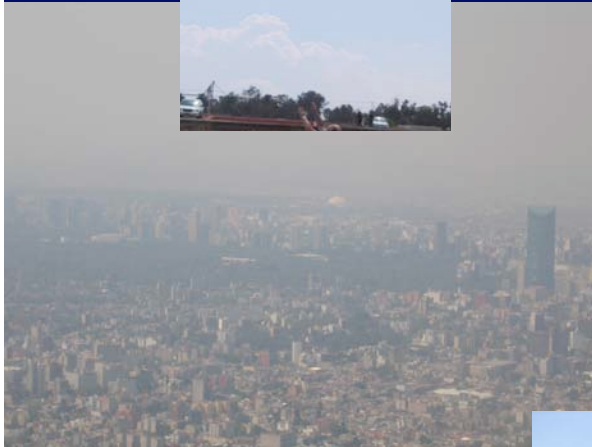
Dependence on gas-phase precursors

Urban vs regional vs global impacts – Effects of transport and scale for aerosol forcing

Spatial Impacts – Horizontal and Vertical – Temporal

Field Campaign Period

**MAX-MEX/MILAGRO Began March 1, 2006
with Data Taken to March 29, 2006**



Anticipated Further Analyses and Results

- Examination of size-dependent aerosol composition as function of “age” subsequent to emission and chemical processing.
- Attribution of changes in size-dependent composition to specific processes.
- Quantification of secondary organic aerosol production.
- Comparison of properties of biomass burn and urban soot aerosols.
- Examination of dust events and dust interactions with urban aerosol.
- Examination of hygroscopic growth, CCN properties, and precipitation scavenging in relation to aerosol properties.
- Quantitative description of aerosol transport.
- Examination of evolution of composition and optical properties of black carbon and secondary organic aerosol.
- Evaluation of performance of current models.
- Development of new and/or improved treatments of aerosol processes.

VERY RICH DATA SET!

8:37 *The Use of Anthropogenic, Biomass Burning, and Volcanic Emission Estimates for Modeling Particulates Downwind of Mexico City* **Jerome Fast and Christine Wiedenmyer**

8:44 *Airborne High Spectral Resolution Lidar Observations of Aerosol Spatial Distribution and Optical Properties from MAX-MEX* **John Hair, Rich Ferrare, Chris Hostetler, Anthony Cook, and David Harper**

8:51 *Observations of elemental carbon specific absorption at the T1 and T2 sites during the Max-Mex field campaign* **J. C. Doran, J. C. Barnard, J. D. Fast, E. I. Kassianov, N. S. Laulainen, M. S. Pekour, W. J. Shaw, X.-Y. Yu, W. P. Arnott, L. Paredes-Miranda, R. Coulter, T. Martin, L. Kleinman, S. R. Springston, R. Cary, and D. F. Smith**

8:58 *Aerosol Optics During Max-Mex* **W. Patrick Arnott and Lupita Paredes**

9:05 *Observations Regarding New Particle Formation in Mexico City* **Kenjiro Iida, Mark Emery, Mark Stolzenburg, and Peter H. McMurry**

9:12 *The Chemical Composition of Particles Formed by Nucleation in Tecamac, Mexico During MILAGRO* **Jim Smith and Pete McMurry**

9:19 *Secondary Organic Aerosol Formation From Anthropogenic Air Pollution* **R. Volkamer, J. L. Jimenez, F. San Martini, K. Dzepina, Q. Zhang, D. Salcedo, D. R. Worsnop, M. J. Molina, and L. T. Molina**

9:26 *Thermodenuder-Aerosol Mass Spectrometer System to Characterize the Aerosol Chemically-Resolved Volatility: Results from Mexico City* **J. Alex Huffman, Jose-Luis Jimenez, Paul J. Ziemann, John T. Jayne, Timothy Onasch, and Doug R. Worsnop**

9:33 *SOA Production and Light Absorption as a Function of Photochemical Age* **Larry Kleinman, Stephen Springston, Gunnar Senum, Yin-Nan Lee, Jian Wang, Linda Bowerman, Peter Daum, Judy Weinstein-Lloyd, John Hubbe, Mike Ortega, Liz Alexander, John Jayne, and Manjula Canagaratna**

9:40 *Variation of Aerosol Size Distribution and CCN Spectrum at Urban Site During MILAGRO* **J. Wang**

9:47 *Absorbing aerosol measurements in a Megacity, in Polluted Clouds and from Biomass Burning: Constraining their climate forcing* **Claudio Mazzoleni, Manvendra Dubey, Petr Chylek, Pat Arnott, Lupita Paredes, Timothy Onasch, and John Seinfeld**

MAX-Mex and MILAGRO Continue

Data Sets

Final Data Sets – March 2007



MILAGRO Science Meeting – October 2006 – Just Completed:

Preliminary Analyses

Data Assessments for Publications Underway

Acknowledgments

ASP MAX-MEX Science Team

Pilots and ASP Science Support personnel

MILAGRO Participants

Our Mexican Hosts – INE, CENICA, SENEAM, IMP, UT Tecamac

THE PROJECT WAS CARRIED OUT SAFELY WITH NO INCIDENTS.